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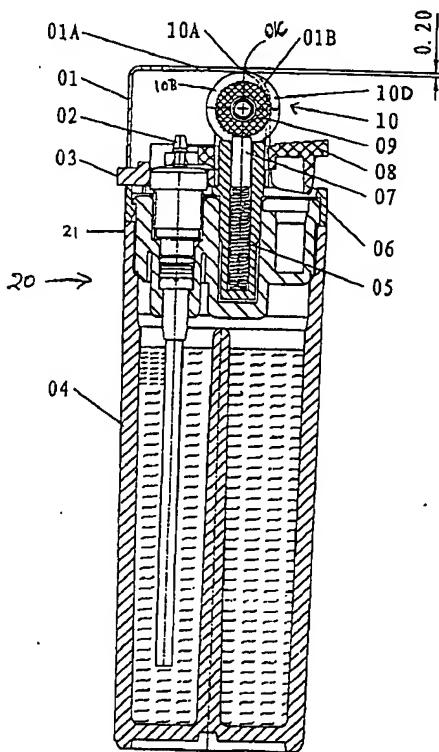
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(54) Title: SAFETY LIGHTER WITH A WINDSHIELD AND METHOD FOR MAKING SAME



(57) Abrégé/Abstract:

A safety lighter with improved windshield and thumb surrounding the striker wheel. The shield extends above the top dead center height of the wheel so that the wheel may be rotated only by applying substantial torsional forces along a rearward section of the wheel. A rearward opening in the shield allows the user to apply torsional force to the wheel over a limited surface area; thus, it is difficult for children to activate the lighter by rotation of the wheel.

ABSTRACT OF THE DISCLOSURE

A safety lighter with improved windshield and thumb surrounding the striker wheel. The shield extends above the top dead center height of the wheel so that the wheel may be rotated only by applying substantial torsional forces along a rearward section of the wheel. A 5 rearward opening in the shield allows the user to apply torsional force to the wheel over a limited surface area; thus, it is difficult for children to activate the lighter by rotation of the wheel.

## SAFETY LIGHTER WITH A WINDSHIELD AND METHOD FOR MAKING SAME

BACKGROUND OF THE INVENTIONField of the Invention

The present invention relates to the field of lighters, such as cigarette lighters.  
5 More particularly the invention relates to safety lighters having rotary striker wheels and a method for making the same.

Related Prior Art

U.S. Patent No. 5,769,625 discloses a state of the art safety lighter with an improved striker wheel and striker wheel mounting frame. The lighter has an igniter 10 having a striker wheel which rotates about an axis in response to force applied to the wheel by a user's finger. The annular recessed center portion of the striker wheel's outer annular surface has protuberances formed thereon (or grooves formed therein), while the annular unrecessed lateral portions of the striker wheel's outer annular surface are smooth. Further, the striker wheel is mounted to the lighter in slots. The striker wheel is pressed 15 from a first position having insufficient spring force to cause the lighter flint to spark when the striker wheel is rotated into a second position having sufficient spring force to cause the lighter flint to spark when the striker wheel is rotated.

While the depression of the striker wheel from a first position to a second position is an effective safety mechanism, the present invention provides an improvement whereby 20 the rotating striker wheel is shielded by a thumb and wind shield such that only a small portion of the torsional force is actually exerted on the striker wheel when the annular unrecessed lateral portions of the striker wheel are struck by a user's thumb. The operation of the present invention is too complicated and difficult for children to perform.

SUMMARY OF THE INVENTION

The present invention is a safety lighter and method for making a safety lighter having a striker wheel which rotates about an axis in response to force applied to the wheel by a user's thumb (or any other finger or hand part). The striker wheel has an annular recessed center area with a rough surface to cause a flint or the like to spark. The 5 striker wheel further has annular unrecessed lateral portions adjacent the annular recessed area. A mounting frame is attached to the top end of a lighter body and has openings therein to support and rotatably receive the axle of the striker wheel. A shield is mounted on the mounting frame and generally surrounds the striker wheel except for a rearward section of the wheel. The vertical height of the shield is higher than the vertical top dead 10 center height of the annular unrecessed lateral portions of the striker wheel. The shield has a rearward opening sized to allow a rear section of the lateral portions of the striker wheel to extend rearwardly beyond the opening. Thus, when the lighter of the present invention is activated, only a small portion of the torsional force is actually exerted on the 15 striker wheel when the lateral portions are struck by a thumb. A large part of the thumb force is absorbed by the lighter, specifically the shield. Therefore, the friction between the striker wheel and the flint stone is substantially reduced. A flame cannot be ignited without the required sparks to burn the gas as ejected. In order to light a flame, it is necessary to increase the torsional force of the thumb.

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BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 illustrates a cross-sectional view of the safety lighter of the present invention.

25 Fig. 2 shows an exploded schematic view of the safety lighter of the present invention.

Fig. 3 is a detailed perspective view of the components of the safety system of the present invention.

Fig. 4 illustrates a perspective partially enlarged view of the safety system of the present invention.

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#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

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Fig. 1 shows a cross-sectional view of the safety lighter 20 of the present invention. The lighter has a windshield 1, nozzle 2, flame adjusting ring 3, lighter body 4, flint spring 5, a spring receptacle 23, mounting frame 6, flint stone 7, actuating button 8, and striker wheel 10 having a rough annular recessed section 9 and annular unrecessed lateral portions 10B.

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Striker wheel 10 and the two lateral portions 10B are assembled through rotational axle 10C to form a striker wheel composite. This striker wheel composite is mounted on mounting frame 6 by inserting the rotational axle 10C of the composite into positioning holes 6A of mounting frame 6. The composite rotates about axle 10C if a force is applied to rotate the striker wheel 10. During rotation, rough annular recessed section 9 will strike flint stone 7 to give out sparks.

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As may be seen in Figs. 1 and 2, the top part 1A of windshield 1 is designed in a position such that it has a vertical height (the top 1C of the shield) higher than the top dead center height 10A of the annular unrecessed lateral portions 10B of striker wheel 10. The windshield 1 is designed with an ample rear top part 1B in an arc shape.

A rearward opening 11 in the shield is sized to allow the rearward section 10D of the striker wheel 10 and, particularly, the annular recessed lateral portions 10B to extend rearwardly beyond the rear top part 1B of the shield 1.

Fig. 1 shows that the vertical height of the top 1C of the shield is approximately 0.20 inches higher than the top dead center 10A of the lateral portions 10B when the striker wheel axle 10C is in the positioning holes 6A. This distance may vary slightly, but the intent is to keep the user's thumb from applying significant torsional force to the wheel.

These special features are designed for the purpose of shifting a majority of the actuating force away from the striker wheel as applied by the thumb to the striker wheel composite in any attempt to light a flame.

- The upper part of nozzle 2 is engaged to the front end of actuating button 8.
- 5 When the rear end of actuating button 8 is pressed downward, nozzle 2 will be raised by actuating button 8 to eject gas contained in lighter body 4. The nozzle is protected from the wind by windshield 1.

Flint stone 7 and flint spring 5, after being compressed, are assembled underneath striker wheel 10 in spring receptacle 23 and the entire striker wheel composite is mounted 10 on mounting frame 6 through the positioning holes 6A. Flint stone 7 gives out sparks when struck by rough section 9 of striker wheel 10. These sparks light the gas ejected from nozzle 2. However, there needs to be sufficient force to initiate the desired rotation of striker wheel 10 to strike flint stone 7 in order to obtain sparks. The lateral unrecessed portions 10B may be smooth or roughened (see Fig. 3) to vary the difficulties of rotating 15 the wheel 10. The idea of the present design is to work against the thumb force applied onto the side wheels so as to make it more difficult to generate sparks from the lighter in order to achieve the purpose of childproofing.

Figs. 3 and 4 show the present invention in greater detail. The top part 1A of windshield 1 is higher than the top dead center 10A of annular unrecessed lateral portions 20 10B of striker wheel 10. When the user uses his thumb to rotate the striker wheel composite, his thumb will partially be blocked by the top 1A of windshield 1. The majority of the thumb force applied will be shifted to the sides 1C of windshield 1. Only 25 a small part of the thumb force remains to exert on the lateral unrecessed portions 10B. Such a small amount of force can in no way actuate rotation of striker wheel 10 against the flint stone 7. Therefore, no spark can be generated to ignite the gas ejected from nozzle 2.

Of course, the user can choose to strike the no-barrier portion 10D of the strike wheel 10 extending beyond the opening 11 in the rear of the shield 1. As may be seen in

Figs 3 and 4, the top 1A of the shield 1 extends above and rearwardly beyond the longitudinal axis A<sub>x</sub> of the axle 10C of the striker wheel 10.

Under such circumstances, the user has to increase his thumb force to a certain level such that the rough section 9 can strike against flint stone 7 to give out sparks which in turn light the gas ejected by nozzle 2. Children are unable to obtain a flame from the lighter to the present invention because of their limited abilities physically and of the mind.

From the foregoing, one of ordinary skill in the art would comprehend the method for manufacturing the safety lighter 20 of the present invention. A rather conventional lighter body 4 is provided with a top end 21 of the lighter body 4. The frame 6 has openings 6A formed therethrough to rotatably receive an axle 10C of a striker wheel 10. The frame 6 is more fully described above.

The striker wheel 10 having the axle 10C and an annular recessed center portion 9 with a rough surface formed thereon and annular unrecessed lateral portions 10B disposed beside and adjacent the annular recessed center portion 9 is inserted into the mounting frame. Again, the structure of the wheel 10 is described above.

A shield 1, also described in detail above, is mounted on the mounting frame. A spring 5 is inserted within the spring receptacle 23. A flint stone 7 may be inserted between the spring 5 and the striker wheel 10, such that the spring 5 exerts a compressive force against the flint 7 and urges the flint 7 into contact with the rough surface 9 of the striker wheel 10.

The above has described a unique safety lighter and method for making the same. It should be understood that various changes of the details, materials, arrangements of parts and uses which have been herein described and illustrated in order to explain the nature of the invention will occur to and may be made by those skilled in the art upon the reading of this disclosure, and such changes are intended to be included within the principles and scope of this invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A safety lighter comprising:

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a lighter body having a top end;

10 a striker wheel, said striker wheel having a central axle and an annular recessed center portion with a rough surface formed thereon and annular unrecessed lateral portions disposed beside said annular recessed center portion;

15 a mounting frame attached to said top end of said lighter body, said mounting frame having openings formed therethrough to rotatably receive said axle of said striker wheel and having a spring receptacle;

a shield mounted on said mounting frame, said shield having a top with a vertical height greater than the vertical top dead center height of said annular unrecessed lateral portions of said striker wheel when said striker wheel axle is received in said opening of said mounting frame;

20 a spring received within said spring receptacle;

a flint; and

25 said spring exerting a compressive force against said flint and urging said flint into contact with said rough surface of said annular recessed center portion of said striker wheel.

- 25 2. The lighter of claim 1 wherein said shield further comprises a rearward opening sized to allow a rear section of said striker wheel to extend rearwardly beyond said opening.
3. The lighter of claim 1 wherein said top of said shield extends above and rearwardly beyond the longitudinal axis of said axle of said striker wheel.

4. The lighter of claim 1 wherein said annular unrecessed lateral portions of said striker wheel have smooth surfaces for accepting torsional forces.
5. The lighter of claim 1 wherein said annular unrecessed lateral portions of said striker wheel have roughened surfaces for accepting torsional forces.
6. A method for manufacturing a safety lighter comprising:
  - providing a lighter body having a top end;
  - 10 providing a striker wheel assembly, said striker wheel having a central axle and an annular recessed center portion with a rough surface formed thereon and annular unrecessed lateral portions disposed beside said annular recessed center portion;
  - attaching a mounting frame to said top end of said lighter body, said mounting frame having openings formed therethrough to rotatably receive said axle of said striker wheel and having a spring receptacle;
  - 15 inserting said striker wheel assembly into said mounting frame;
  - mounting a shield on said mounting frame, said shield having a top with a vertical height greater than the vertical top dead center height of said annular unrecessed lateral portions of said striker wheel when said striker wheel axle is received in said opening of said mounting frame;
  - 20 inserting a spring within said spring receptacle; and
  - inserting a flint between said spring and said striker wheel such that said spring exerts a compressive force against said flint and urges said flint into contact with said rough surface of said annular recessed center portion of said striker wheel.
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7. The method of claim 6 wherein said shield further comprises a rearward opening sized to allow a rear section of said striker wheel to extend rearwardly beyond said opening.
- 5       8. The method of claim 6 wherein said top of said shield extends above and rearwardly beyond the longitudinal axis of said axle of said striker wheel.
9. The method of claim 6 wherein said annular unrecessed lateral portions of said striker wheel have smooth surfaces for accepting torsional forces.
- 10      10. The method of claim 6 wherein said annular unrecessed lateral portions of said striker wheel have rough surfaces for accepting torsional forces.

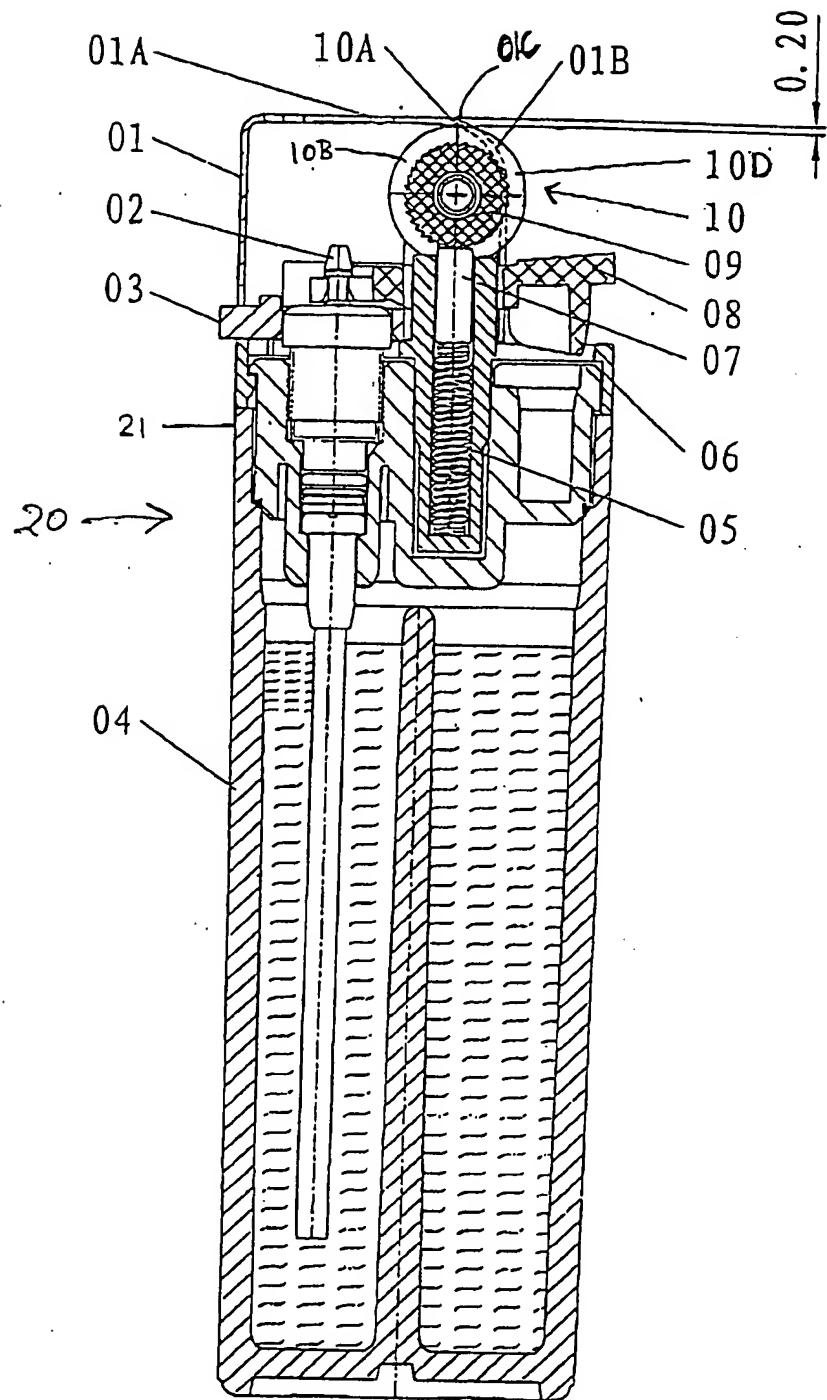


FIG. 1

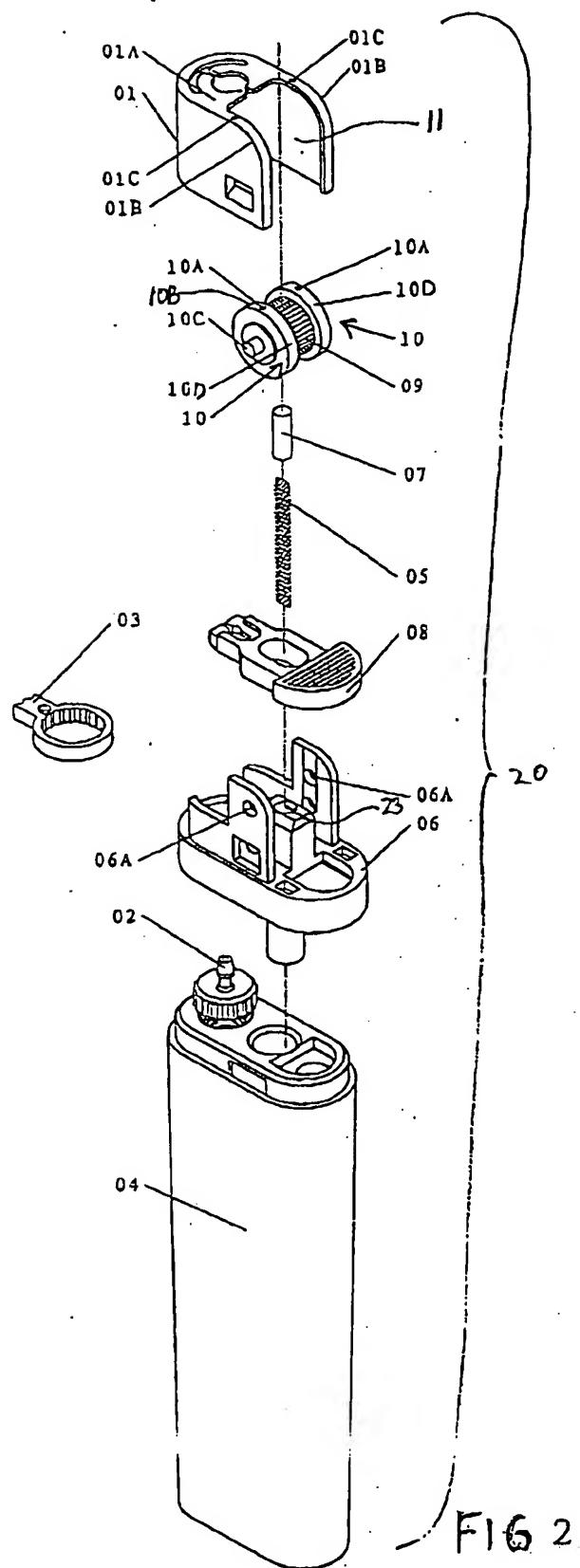


FIG 2

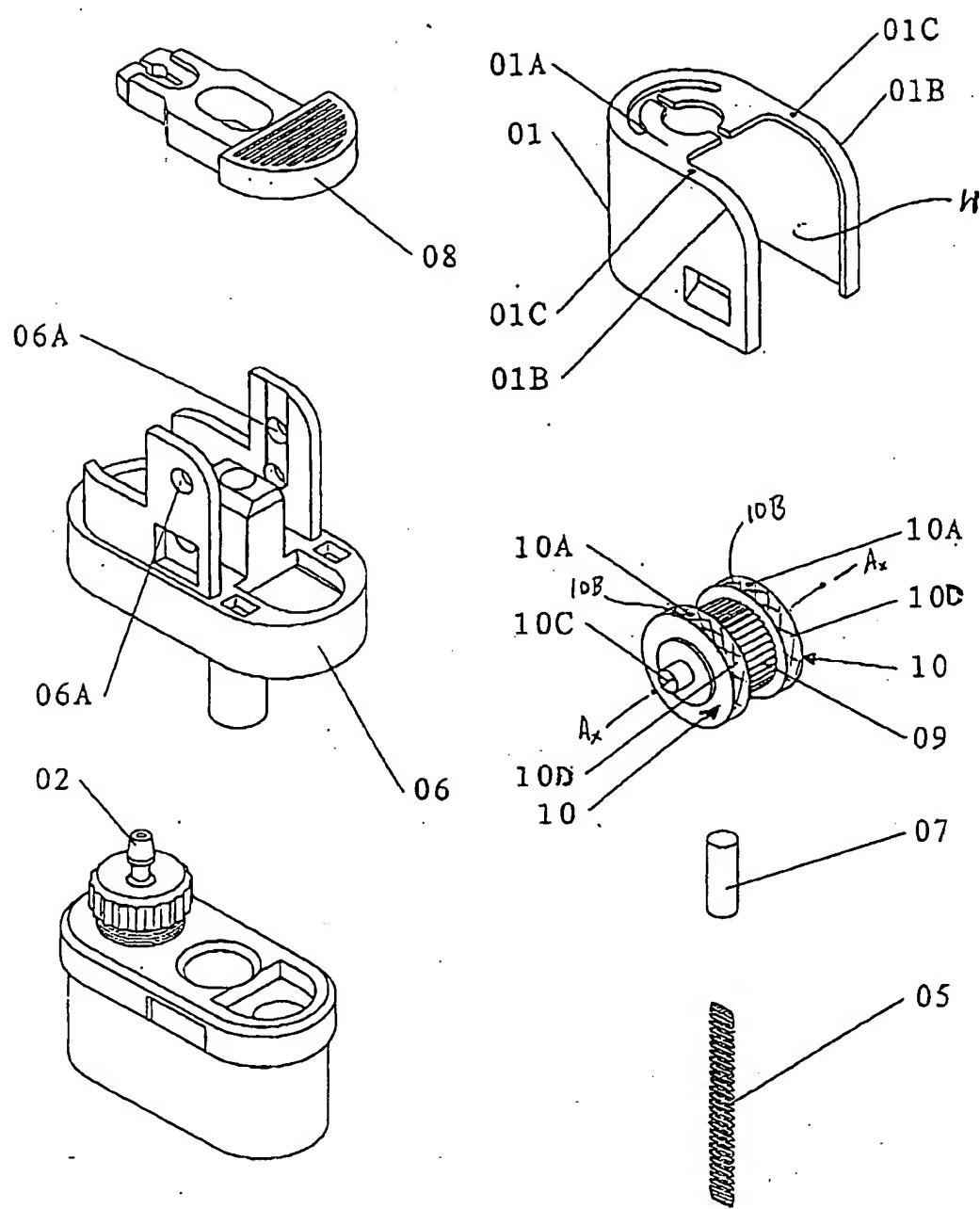


FIG. 3

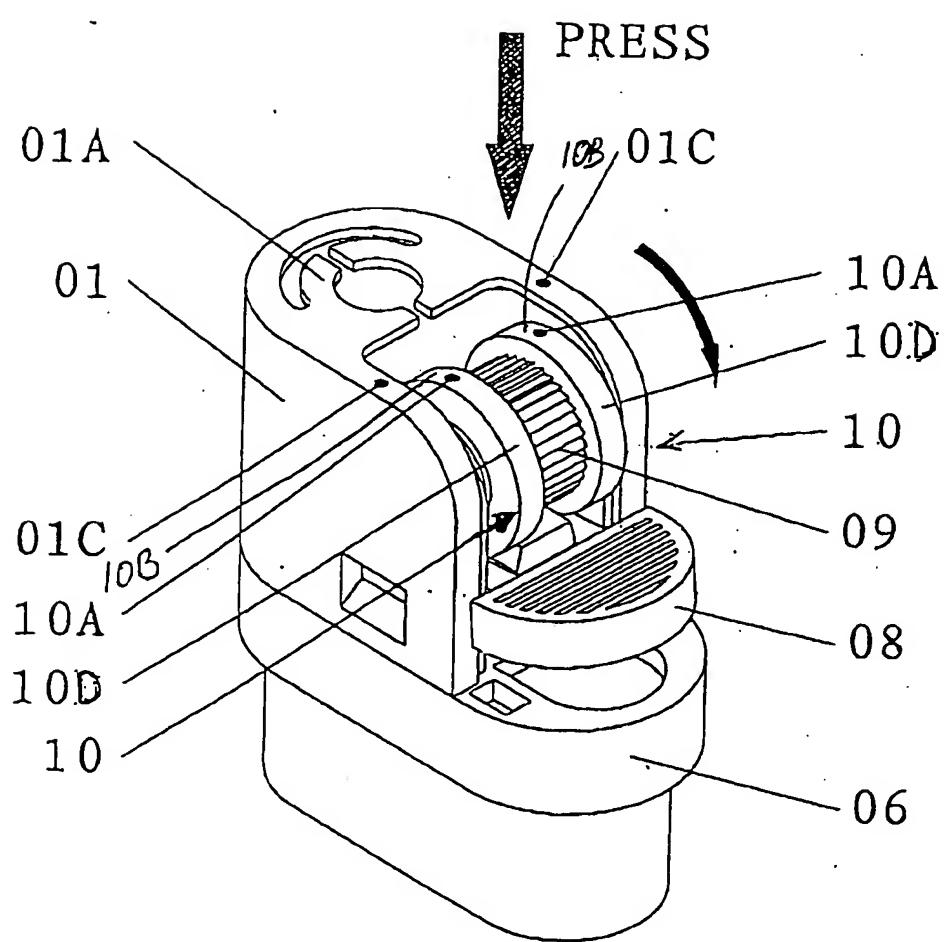


FIG. 4

